

MINIMIZING DROSS CREATION IN MOLTEN ALUMINUM TRANSFER



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ARTICLE TAKEAWAYS:

- Reducing metal loss should be a primary focus of all foundries/die casters
- Understanding dross creation and metal loss
- Metal transfer techniques - reduce dross creation & save money

It is a simple enough concept that the goal of any molten metal processing business should be to finish the process with the amount of metal for sale that is as close as possible to the amount you started with.

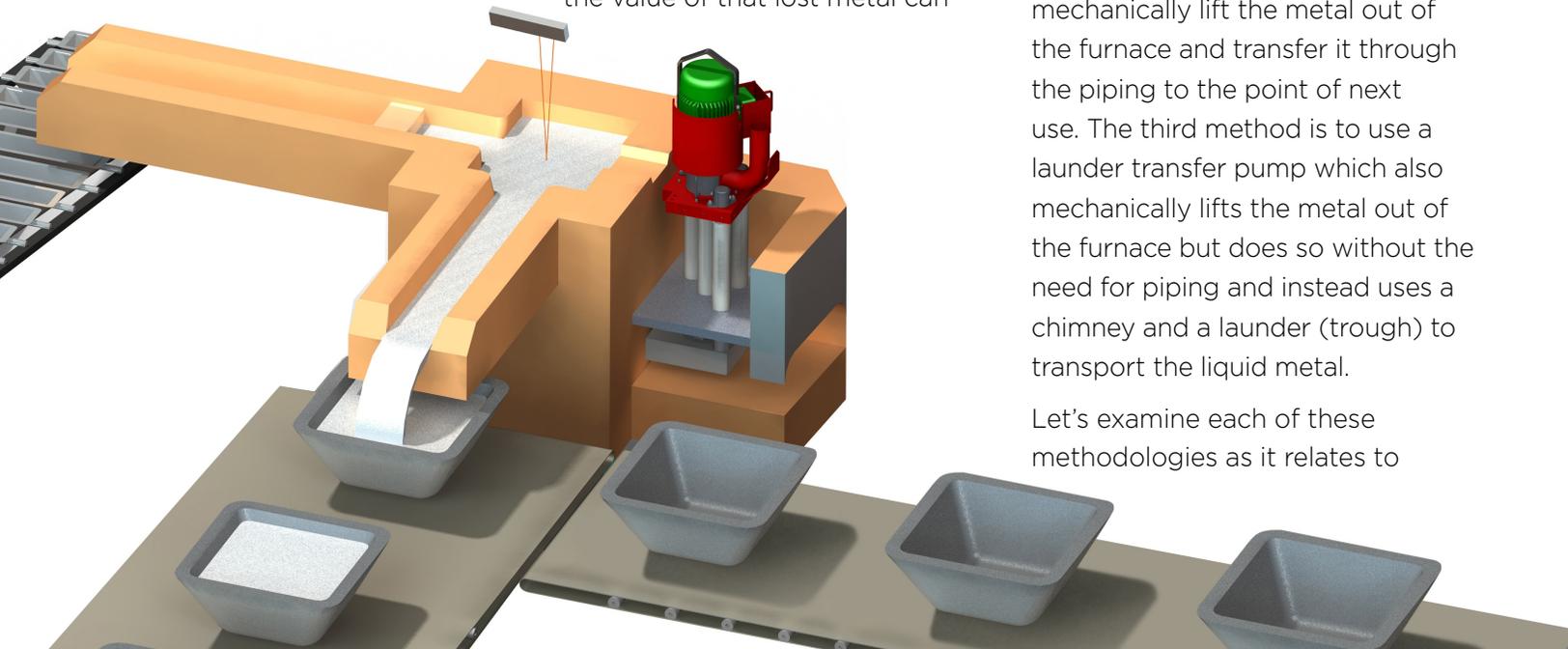
Whether you start with ingot, scrap or molten aluminum, the closer you can get to 100% utilization, the better. As we all know, this is easier said than done, and depending on what type of process you are running, there can be many areas where metal is “lost.” When molten aluminum oxidizes to create dross, the value of that lost metal can

never be fully recovered. This has an immediate negative impact on profitability, and so focusing on areas where metal loss can be reduced is vital to the health of your business. One of the areas where this type of loss occurs is when metal is being transferred out of the furnace. Let’s look at some of the ways we can minimize metal loss in the metal transfer process.

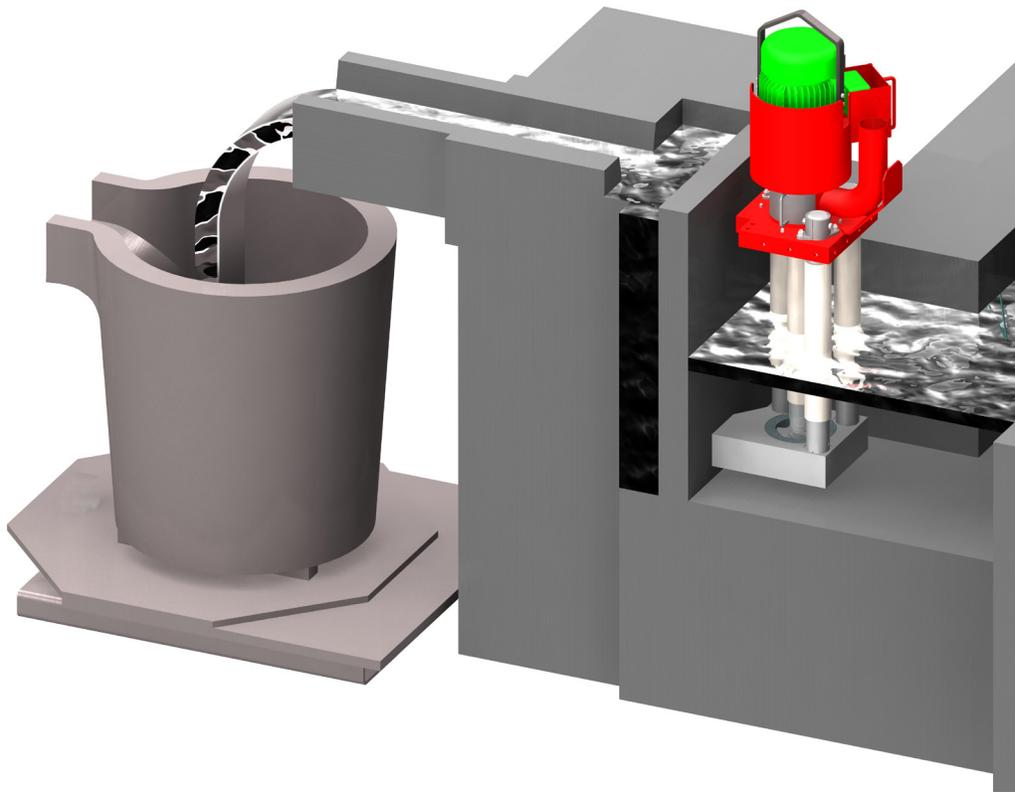
Metal Loss During Transfer

There are essentially 3 methods for transferring metal out of reverberatory furnaces. The first is to use a tap out plug and gravity and to transfer the metal by removing the tap out plug and allowing gravity to drain the furnace. The second method is to use a traditional transfer pump with a riser tube and piping to mechanically lift the metal out of the furnace and transfer it through the piping to the point of next use. The third method is to use a launder transfer pump which also mechanically lifts the metal out of the furnace but does so without the need for piping and instead uses a chimney and a launder (trough) to transport the liquid metal.

Let’s examine each of these methodologies as it relates to



potential for dross creation and thus metal loss. There are two major causes of dross creation when transferring metal from the furnace: aluminum exposure to oxygen and turbulence in metal flow. While gravity is free, the use of tap out plugs and a trough with a downward slope makes it very challenging to control the flow of metal. If the flow is too slow, you freeze the metal, too fast and you create turbulence which has the effect of exposing more aluminum to the air than necessary or desired, increasing dross creation and reducing the amount of metal available for sale. In a traditional transfer pump, there is a greater ability to control the flow of the metal by using the variable speed drive that controls the pump motor. Depending on how high the metal needs to be lifted to get it out of the furnace and to its next point of use, the speed of the pump, and thus velocity of the metal can be controlled. The use of piping, however, restricts the flow of the metal and can result in turbulence as the metal exits the piping, given that the metal is forced out of the piping at a higher velocity due to the need to satisfy the lift requirements. The launder transfer pump best addresses the velocity issue by utilizing a “chimney” in which the metal rises up without the restriction of a pipe and with the significant benefit of limiting the amount of air the aluminum comes in contact with, thus creating a skin



that protects all the metal beneath it from oxidizing. As the metal exits the chimney and enters the launder it flows quiescently to the next point of use, with no added dross creation. It has been our experience that this method of metal transfer can reduce dross creation by more than 50%.

Safety & Accident Prevention

A very important factor in today’s manufacturing environment is safety and accident prevention. Systems that utilize mechanical pumps and remove the operator from any potential direct contact with molten aluminum are much safer to operate and significantly reduce the possibility of dangerous accidents. Another area for

exploration in a future article related to these metal transfer systems is metal quality, as here also there are many benefits to explore.

There are many plant specific factors that will influence the decision as to which metal transfer methodology to deploy. Focusing on reducing metal lost to dross creation should be very near the top of the list for all molten aluminum processors. To the extent you can reduce aluminum contact with oxygen and turbulent metal flow, you will have more saleable metal at the end of your process.



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